

**STORAGE MEDIA SCANNER APPARATUS AND METHOD  
PROVIDING MEDIA PREDICTIVE FAILURE ANALYSIS AND  
PROACTIVE MEDIA SURFACE DEFECT MANAGEMENT**

**INVENTORS:**

Archibald, Jr., John Edward

McKean, Brian Dennis

**FIELD OF THE INVENTION**

This invention pertains generally to data or information storage system and subsystems, and more particularly to controllers and controller methods and procedures for such data or information storage systems and subsystems.

**5 BACKGROUND**

As the capacity of data and information storage and retrieval systems and servers increase and the desirability of providing sometimes significant capacity for growth on such systems increases, storage devices, such as rotating magnetic hard disk drives may have large regions of media that are subject to wear and aging by virtue of the operation of the hard disk drive generally, the movement of one or more transducer heads over the media surface when accessing other regions of the disk drive, and any power-up (spin-up) or power-down (spin-down) that the media surface may be subjected to. The factors that cause media surface wear and failure are known in the art and

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Therefore, although it is known to scan disk drive media to determine the viability of writing to and reading from a disk drive surface, such disk drive scanning and testing have heretofore been limited. For example, there remains a need to be able to perform preemptive and proactive diagnostics on regions of a disk drive or other recording media based storage system on a non-interfering basis during normal operation of the storage system so that media that defects are identified before attempts are made to write data to such media. There also remains a need for the ability to perform non-destructive write testing to regions of the disk drives that have previously been written to by a host computer system storing data to and retrieving data from the storage system, particularly where the data may constitute an archive of data or information that was written previously and will not be routinely accessed.

## SUMMARY

The present invention provides structure, method, apparatus, system, and computer program for background operation storage media surface scanning and predictive media failure analysis with optional but desirable proactive media defect management. In one embodiment, predictive media failure analysis data and optional reports generated identify incidents of recoverable and unrecoverable storage media read operation and media write operation failures. This media failure analysis data enables proactive media defect management to take any desired or required steps to recover media defects or errors before an attempt is made to read or write (access) an affected portion of the media. For example, the proactive defect management system and method monitors and manages the storage system, storage subsystem, hard disk drives, disk surface, disk sector, or other defined portion of a storage system or device, and takes the necessary steps to recover media errors prior to a host computer attempting to access an affected media, such as a disk sector having a media defect.